



Microbial Safety of Seafoods

Program Background

The Microbial Safety of Aquaculture Products Center of Excellence was established on the campus of Delaware State University, Dover, DE, in 1999, as part of the USDA, Agricultural Research Service's Microbial Food Safety Research Unit. Centers for Excellence are partnerships between the USDA and colleges or universities, and are intended to foster complementary research on problems of National and regional concern and to enhance cooperative research at participating schools.

One of the most pressing problems related to shellfish safety is the contamination of oysters, clams and mussels with enteric viruses and bacterial pathogens. Among those microorganisms most associated with shellfish-related illnesses are hepatitis A virus (HAV), Noroviruses (Norwalk-like viruses), and bacteria of the genus *Vibrio* (including the *Vibrio* which causes cholera).

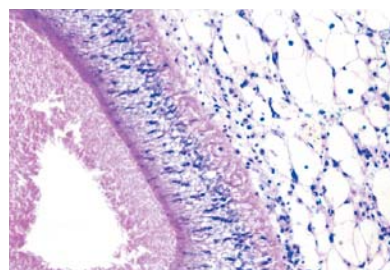
The overall mission of the laboratory is to develop rapid, cost effective, and practical methods to detect these microorganisms in fish and shellfish and to evaluate processing strategies to eliminate such pathogens. Information and methods are provided to health and regulatory agencies.

Research Objectives

Over the next 5 years, the seafood safety program will focus its resources on:

- developing rapid test procedures for the detection of hepatitis A and Norovirus contamination from shellfish using molecular biological and cell culture-based methods.
- evaluating the uptake, distribution and spread of enteric viruses and vibrios from shellfish maintained under natural conditions.
- developing improved shellfish depuration and other purification techniques such as high pressure processing to eliminate viruses.
- identifying potential virulence proteins in *Vibrio* species.

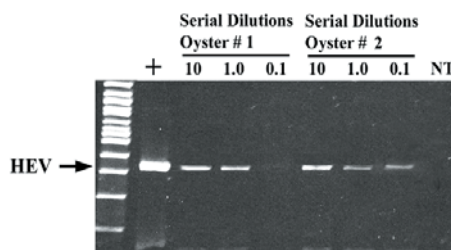
Impact



Oyster tissue stained with hematoxylin and eosin.

As requested by industry, state and federal agencies, improved virus testing methods and shellfish processing strategies were developed to enhance shellfish safety. The new tests provide the means to evaluate the safety of shellfish before they reach the consumer. Among the tools developed are: a cell culture-based assay for HAV, rotavirus and other enteric viruses using chemiluminescence technology and procedures for the extraction and rapid molecular detection of HAV, Norovirus and hepatitis E virus (HEV), an emerging pathogen often found in Asia.

It was determined that HEV can be bioaccumulated by



Molecular biological assay for hepatitis E virus (HEV) in oyster tissues

oysters grown in contaminated water and could pose a threat to the U.S. consumer. High hydrostatic pressure processing was evaluated and found effective to inactivate HAV and a calicivirus. A paper "enteric virus contamination of foods through industrial practices: a primer on intervention strategies" was published as an educational tool for use by industry and regulatory agencies.

Microbial Food Safety Research Unit

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